

Australian/New Zealand Standard™

AS/NZS 2891.9.1:2014

Methods of sampling and testing asphalt

Method 9.1: Determination of bulk density of compacted asphalt—Waxing procedure

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CE-006, Asphalt and Sprayed Surfacing to supersede AS 2891.9.1—2005. It is based on VicRoads (Roads Corporation, trading as ‘VicRoads’) method CRB 202.04, *Bulk Density of Compacted Asphalt Specimens by Waxing* (August 1976).

The objective of this Standard is to set out the method to determine the bulk density of compacted dense graded asphalt using a waxing procedure.

The objective of this revision is to reflect current practice to ensure correct waxing procedures and to permit vacuum drying.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

METHOD

1 SCOPE

This Standard sets out the method for determining the bulk density of compacted dense graded asphalt using a waxing procedure.

NOTE: Determining the density of relatively thin samples (e.g. where the asphalt thickness is less than 2.5 times the asphalt nominal size) may result in more variable or unreliable results due to the small size and the increased influence of surface voids. In particular, this is applicable to larger sized mixes with large surface voids such as nominal size 14 mm asphalt or greater and or stone mastic asphalt.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- 2891 Methods of sampling and testing asphalt
- 2891.1.2 Method 1.2: Sampling—Coring method
- 2891.1.3 Method 1.3: Sampling—Asphalt from slabs

AS/NZS

- 2891.1.1 Method 1.1: Sampling—Loose asphalt
- 2891.2.2 Method 2.2: Sample preparation—Compaction of asphalt test specimens using a gyratory compactor
- 2891.5 Method 5: Compaction of asphalt by Marshall method and determination of stability and flow—Marshall procedure

3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 2891.1.1 apply.

4 SAFETY PRECAUTIONS

Care should be taken when using molten wax.

5 APPARATUS

The following apparatus is required:

- (a) *Balance* Balance of sufficient capacity, with a limit of performance not greater than ± 0.5 g. The balance shall also be equipped with a means for weighing beneath the balance.
- (b) *Suspension device* Nylon loop or wire frame to suspend the asphalt sample.
- (c) *Water container* Filled with water and fitted with an overflow device and of sufficient capacity to contain the suspended asphalt sample while maintaining a constant water level.
- (d) *Paraffin wax bath* Capable of maintaining wax at a temperature about 10°C above its melting point.
- (e) *Paint brush* About 13 mm in width.
- (f) *Thermometers:*
 - (i) Thermometer or other suitable temperature-measuring device readable and accurate to 1°C or less covering a range of at least 0 – 50°C .
 - (ii) Thermometer or other suitable temperature-measuring device readable and accurate to 2°C or less covering a range of at least 0 – 200°C .

6 MATERIALS

Paraffin wax of density known to 0.001 t/m^3 .

NOTE: See Appendix A for a suitable method for determining the density of wax.

7 TEST SAMPLE

Unless otherwise specified the asphalt sample may be either compacted in the laboratory in accordance with AS/NZS 2891.2.2 or AS/NZS 2891.5, or removed from a pavement in accordance with AS 2891.1.2 or a slab in accordance with AS 2891.1.3. Any loose particles or foreign matter shall be removed from the sample before testing.

8 PROCEDURE

The procedure shall be as follows:

- (a) Dry the sample to constant mass in air or under vacuum (see Appendix B).

NOTE: Constant mass is reached when the difference between two successive determinations of mass of the asphalt sample, after a further drying period or a period under vacuum for not less than 1 h, differs by no more than 0.1% of the total mass of the sample.
- (b) Weigh the sample and record its dry mass (m_1)
- (c) Hold the sample on the ends (see Figure 1). Carefully coat the sample by dipping it into the wax to partially cover the sample with a thin film of wax. Repeat to cover the remainder of the sample with a thin film of wax. Brush the surface of the sample with additional paraffin wax to coat any unsealed areas.

NOTE: During the waxing process, it is important that no air is trapped between the wax layer and the surface of the sample. It is equally important that wax does not penetrate voids present in the sample. The waxing process should then be conducted carefully without delay and with good temperature control (see Figure 1).

- (d) Cool the coated sample for at least 10 min in air. Weigh the sample and record its mass (m_2).
- (e) Position the water container directly beneath the balance, attach the suspension device and zero the balance.
- (f) Transfer the coated sample to the suspension device and completely immerse the sample. Remove any air bubbles adhering to the coated sample. Weigh the sample and record its mass (m_3).
- (g) Record the temperature of the water in the water container.



FIGURE 1 WAX COATING SPECIMEN